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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,565	12/30/2003	Bryan M. White	884.864US1	8030
21186	7590	05/16/2006	EXAMINER	
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.			LEE, EDDIE C H	
P.O. BOX 2938			ART UNIT	
MINNEAPOLIS, MN 55402			PAPER NUMBER	
			2811	

DATE MAILED: 05/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/748,565

Applicant(s)

WHITE ET AL.

Examiner

Eddie C. Lee

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

In the Amendment filed February 7, 2006, applicant states that claims 1 and 2 have been cancelled. However, in the listing of claims, claims 1 and 2 remain pending. Therefore, these claims will be considered as pending for purposes of examination.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 2 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al.

Note Fig. 2 of Lee et al. where he discloses a die 223, heat sink 204 and a plurality of carbon nanotubes 224 “‘tethered’ to at least one of the die and the heat sink.” Furthermore, note paragraph 52 where Lee et al. discloses “the surface of the at least one of the die and the heat sink has a metal coating.”

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over
Uang et al. in view of Lee et al.

Uang et al. discloses an IC package comprising at least two die or substrates each having a coating of gold 32, 54 thereon, and first and second plurality of carbon nanotubes electrically and thermally coupling the two die or substrate. See Fig. 3. Uang et al. further discloses in the last paragraph of column 2 that the each ends of the carbon nanotubes include an amide and/or thiol based linker (organic moieties) to attach or "tether" the nanotubes to the metal surfaces. The limitations recited in claim 17 regarding "computing system" is implicitly disclosed by Uang et al. since this device will ultimately be part of a "computing system," and the general disclosure of a semiconductor device by Uang et al. encompasses all well know semiconductor devices such as the claimed "dynamic random access memory device." Therefore, the difference between Uang et al. and the claimed invention is Uang et al's failure to disclose a "heat sink."

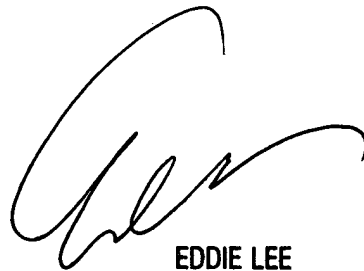
However, Lee et al. discloses at least in Fig. 2 an IC package comprising a die 223, heat sink 204, and a "thermal intermediate structure [224] comprising a plurality of carbon nanotubes, some of which are 'tethered' to at least one of the die and the heat sink." In view of such teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to either include a heat sink or substitute one of the die or substrate for a heat sink for at least the purpose of cooling the die, thus, minimizing the possibility of damaging the die due to excessive heat.

Response to Arguments

Applicant's comments/arguments presented in the Amendment filed February 7, 2006 have been fully considered but deemed to be moot in view of the new grounds of rejection.

Conclusion

Any inquiry concerning this communication should be directed to Eddie C. Lee at telephone number 571-272-1732.

A handwritten signature in black ink, appearing to read 'Eddie Lee', with a large, sweeping initial 'E'.

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800